The College Board

CLEP®

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COLLEGE-LEVEL EXAMINATION PROGRAM

College Mathematics

Description of the Examination

The CLEP College Mathematics exam was developed to cover material generally taught in a college course for non-mathematics majors and majors in other fields not requiring a knowledge of advanced mathematics. Nearly half of the exam requires the candidate to solve routine straightforward problems; the remainder involves solving nonroutine problems in which candidates must demonstrate their understanding of concepts. The exam includes questions on logic and sets, the real number system, functions and their graphs, probability and statistics, and topics from algebra. Familiarity with certain symbolism and notation as illustrated by the sample questions is assumed. The exam places little emphasis on arithmetic calculations, and it does not contain any questions that require the use of a calculator. However, the use of a scientific calculator (non-graphing, non-programmable) is permitted during the exam.

The exam contains approximately 65 multiple-choice questions to be answered in two separately timed 45-minute sections.

Some colleges grant credit for, or exemption from, a specific required mathematics course that covers material similar to that contained in this exam; others may grant up to six semester hours (or the equivalent) of general credit toward fulfillment of a liberal arts or distribution requirement in mathematics.

Knowledge and Skills Required

Within the subject-matter content described, questions on the exam require candidates to demonstrate the following abilities in the approximate proportions indicated.

- Solving routine, straightforward problems (about 50 percent of the exam)
- Solving nonroutine problems requiring an understanding of concepts and the application of skills and concepts (about 50 percent of the exam)

The subject matter of the College Mathematics exam is drawn from the following topics.

	Approximate Percent of Examination
10%	Sets
	Union and intersection
	Subsets
	Venn diagrams
	Cartesian product
10%	Logic
	Truth tables
	Conjunctions, disjunctions, implications, and negations
	Conditional statements
	Necessary and sufficient conditions
	Converse, inverse, and contrapositive
	Hypotheses, conclusions, and counterexamples
20%	Real Number System
	Prime and composite numbers
	Odd and even numbers
	Factors and divisibility
	Rational and irrational numbers
	Absolute value and order
	Binary number system
20%	Functions and Their Graphs
	Domain and range
	Linear, polynomial, and composite functions
25%	Probability and Statistics
	Counting problems, including permutations and combinations
	Computation of probabilities of simple and compound events
	Simple conditional probability
	The mean and median
15%	Additional Algebra Topics
	Complex numbers
	Logarithms and exponentials
	Applications

Sample Questions

The following questions are provided to give an indication of the types of items that appear on the College Mathematics exam. CLEP exams are designed so that average students who have completed distribution requirements in this area can usually answer about half the questions correctly.

Before attempting to answer the sample questions, read all the information about the College Mathematics exam on the preceding pages. Additional suggestions for preparing for CLEP exams are provided in Chapter 1.

Try to answer correctly as many questions as possible. Then compare your answers with the correct answers, given at the end of this examination guide.

Directions: For each of the following problems, choose the best answer for each question.

Notes:

(1) Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

(2) i will be used to denote $\sqrt{-1}$.

(3) Figures that accompany the following problems are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

1. If $R = \{x : x > 0\}$ and $S = \{x : x < 3\}$, what is the number of integers in $R \cap S$?

   (A) None (B) Two (C) Three (D) Four Ⓐ Ⓑ Ⓒ Ⓓ

2. Which of the following is an irrational number?

   (A) $\sqrt{36}$ (B) $\sqrt{14}$ (C) $\frac{2}{\sqrt{9}}$ (D) $\sqrt[3]{-8}$ Ⓐ Ⓑ Ⓒ Ⓓ

3. What is the remainder when $x^3 + 5x^2 - 6x + 10$ is divided by $x + 3$?

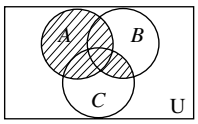
   (A) 7 (B) 10 (C) 46 (D) 64 Ⓐ Ⓑ Ⓒ Ⓓ

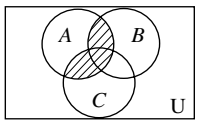
4. If $g(x) = x^3 - 1$, then $g(-2) =$

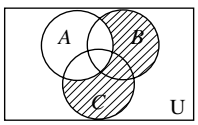
   (A) 5 (B) -3 (C) -7 (D) -9 Ⓐ Ⓑ Ⓒ Ⓓ

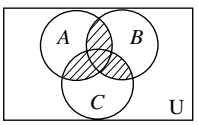
5. Which of the following is a Venn diagram of $A \cap (B \cap C)$?

Ⓐ Ⓑ Ⓒ Ⓓ

(A) 

(B) 

(C) 

(D) 

6. A student asserted that $n^2 \geqq n$ for all real numbers. Of the following, which is a value of n that provides a counterexample to the student's claim?

(A) $-\frac{1}{2}$ (B) 0 (C) $\frac{1}{2}$ (D) 2

Ⓐ Ⓑ Ⓒ Ⓓ

7. If m is an odd integer, which of the following is an even integer?

(A) $2m - 1$ (B) $2m + 1$ (C) $m^2 - m$ (D) $m^2 + m + 1$

Ⓐ Ⓑ Ⓒ Ⓓ

8. If $f(x) = 4x^2 + 5$ and $g(x) = 2^x$, then $f(g(-1)) =$

(A) $\frac{1}{2}$ (B) 6 (C) 9 (D) 21

Ⓐ Ⓑ Ⓒ Ⓓ

9. If x and y are nonzero integers, which of the following is necessarily an integer?

(A) $x + \frac{y}{x}$ (B) $\frac{x + y^2}{x}$

(C) $\frac{x^2 + xy}{x}$ (D) $\frac{x^2 + y^2}{x}$

Ⓐ Ⓑ Ⓒ Ⓓ

10. A drawer contains exactly 5 red, 4 blue, and 3 green pencils. If two pencils are selected at random one after the other without replacing the first, what is the probability that the first one is red and the second one is green?

(A) $\frac{5}{44}$ (B) $\frac{5}{48}$ (C) $\frac{91}{132}$ (D) $\frac{2}{3}$

Ⓐ Ⓑ Ⓒ Ⓓ

11. If f is a linear function such that $f(-1) = 3$, and $f(5) = 15$, then $f(2) =$

    (A) 6 (B) 8 (C) 9 (D) 12 Ⓐ Ⓑ Ⓒ Ⓓ

12. If $i = \sqrt{-1}$, then $i + i^2 + i^3 + i^4 =$

    (A) $-i$ (B) i (C) -1 (D) 0 Ⓐ Ⓑ Ⓒ Ⓓ

13. A fair coin is tossed and a fair die is rolled. What is the probability that the coin will fall heads up and the top face of the die will show 3 or 5?

    (A) $\frac{1}{12}$ (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) $\frac{5}{6}$ Ⓐ Ⓑ Ⓒ Ⓓ

14. The difference between the mean and the median of the numbers 27, 27, 29, 32, and 35 is

    (A) 0 (B) 1 (C) 3 (D) 8 Ⓐ Ⓑ Ⓒ Ⓓ

15. In base two, the next whole number greater than 10101 is

    (A) 101011 (B) 10110 (C) 10111 (D) 10102 Ⓐ Ⓑ Ⓒ Ⓓ

16. If $\log_b x = 6$ and $\log_b y = 2$, then $\log_b \left(\frac{x^2}{y}\right) =$

    (A) 4 (B) 8 (C) 10 (D) 18 Ⓐ Ⓑ Ⓒ Ⓓ

17. A poetry club has 18 members consisting of 8 men and 10 women. How many different slates of a three member steering committee can be formed for the club if there must be at least one man and one woman on the steering committee?

    (A) 640 (B) 720 (C) 1,280 (D) 4,896 Ⓐ Ⓑ Ⓒ Ⓓ

18. One root of $x^2 + x + 1 = 0$ is

    (A) $-\frac{1}{2}$ (B) $\frac{i\sqrt{3}}{2}$

    (C) $\frac{1}{2} - \frac{i\sqrt{3}}{2}$ (D) $-\frac{1}{2} + \frac{i\sqrt{3}}{2}$ Ⓐ Ⓑ Ⓒ Ⓓ

19. "If not S, then not R" is logically equivalent to which of the following?

(A) If S, then R.
(B) If R, then S.
(C) If not R, then not S.
(D) If not R, then S.

Ⓐ Ⓑ Ⓒ Ⓓ

20. If $8^x = 15$ and $8^y = 25$, then $8^{(2x+y)} =$

(A) 55 (B) 80 (C) 250 (D) 5,625

Ⓐ Ⓑ Ⓒ Ⓓ

Study Resources

To prepare for the College Mathematics exam, students should read and study a variety of introductory college level mathematics textbooks. Elementary algebra textbooks cover many of the topics on the Mathematics exam. Students should visit their local college bookstore to determine which textbooks are used by the college for mathematics courses. When selecting a textbook, students should check the table of contents against the "Knowledge and Skills Required" section on pages 1-2.

Additional suggestions for preparing for CLEP exams are provided in Chapter 1.

Answers to Sample Questions

College Mathematics

1. B
2. B
3. C
4. D
5. B
6. C
7. C
8. B
9. C
10. A
11. C
12. D
13. B
14. B
15. B
16. C
17. A
18. D
19. B
20. D